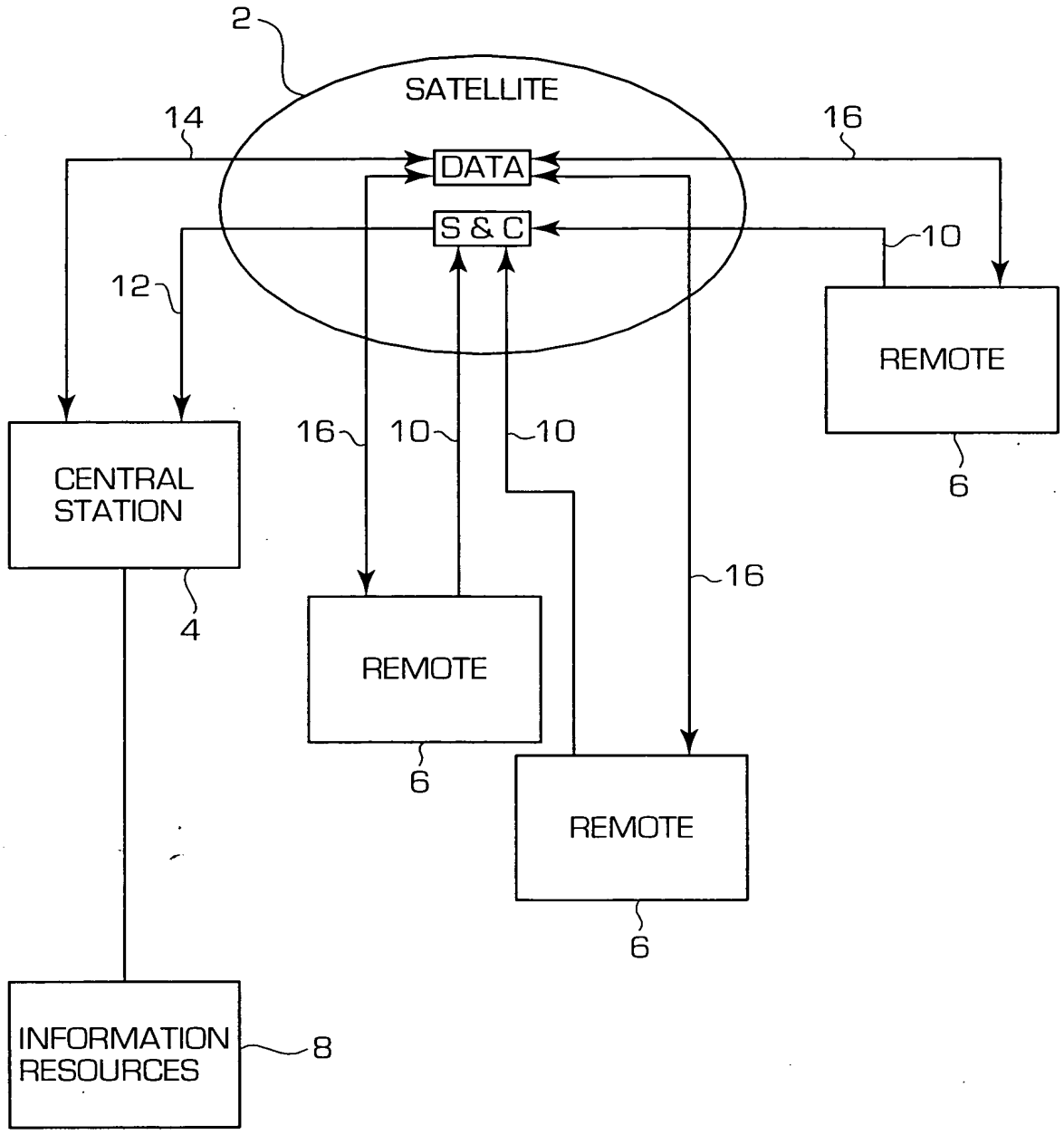

2
SATELLITE
14
16
DATA
S & C
10
12
REMOTE
6
CENTRAL
STATION
4
16
10
10
16
REMOTE
6
REMOTE
6
INFORMATION
RESOURCES
8

FIG. 1

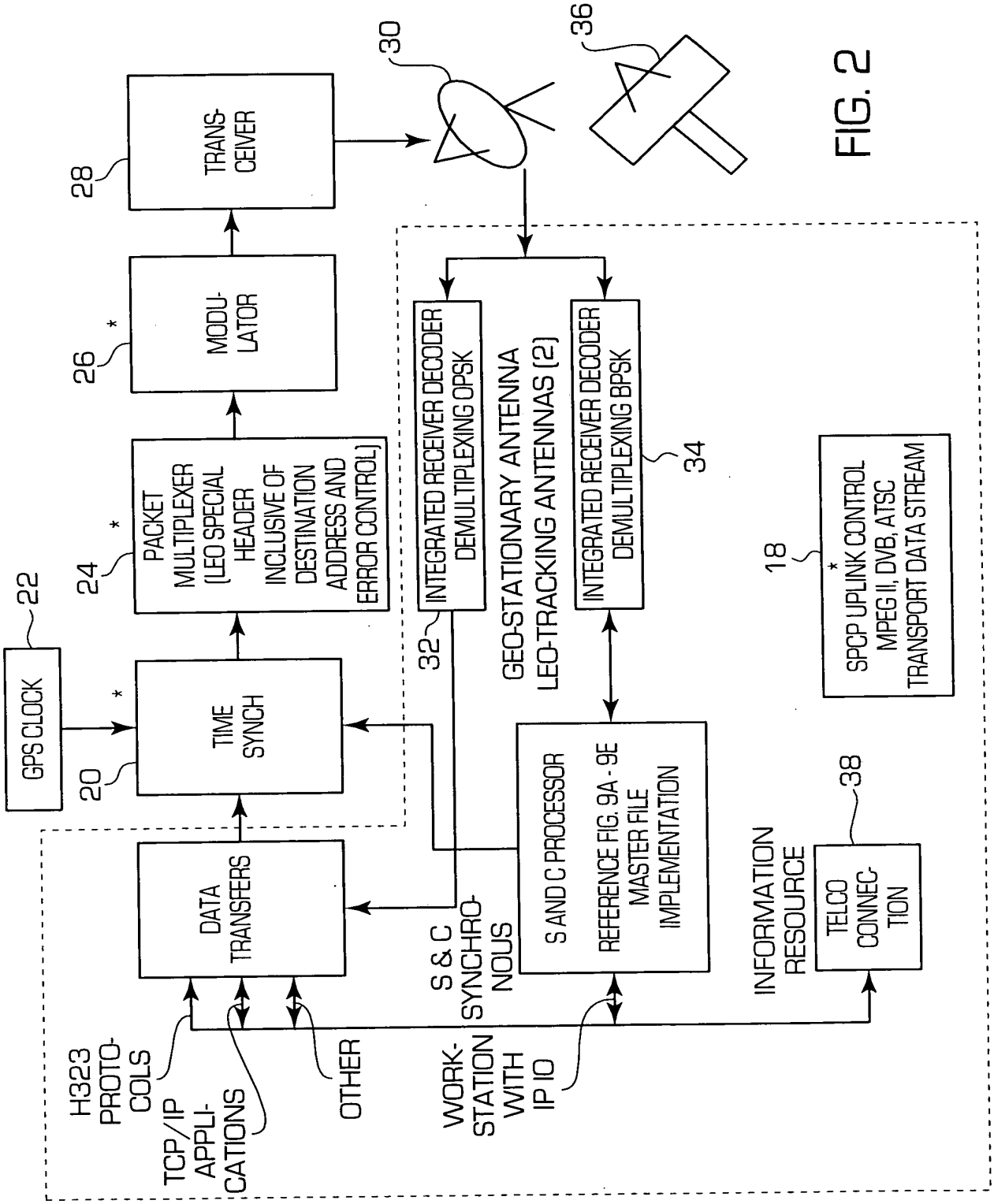
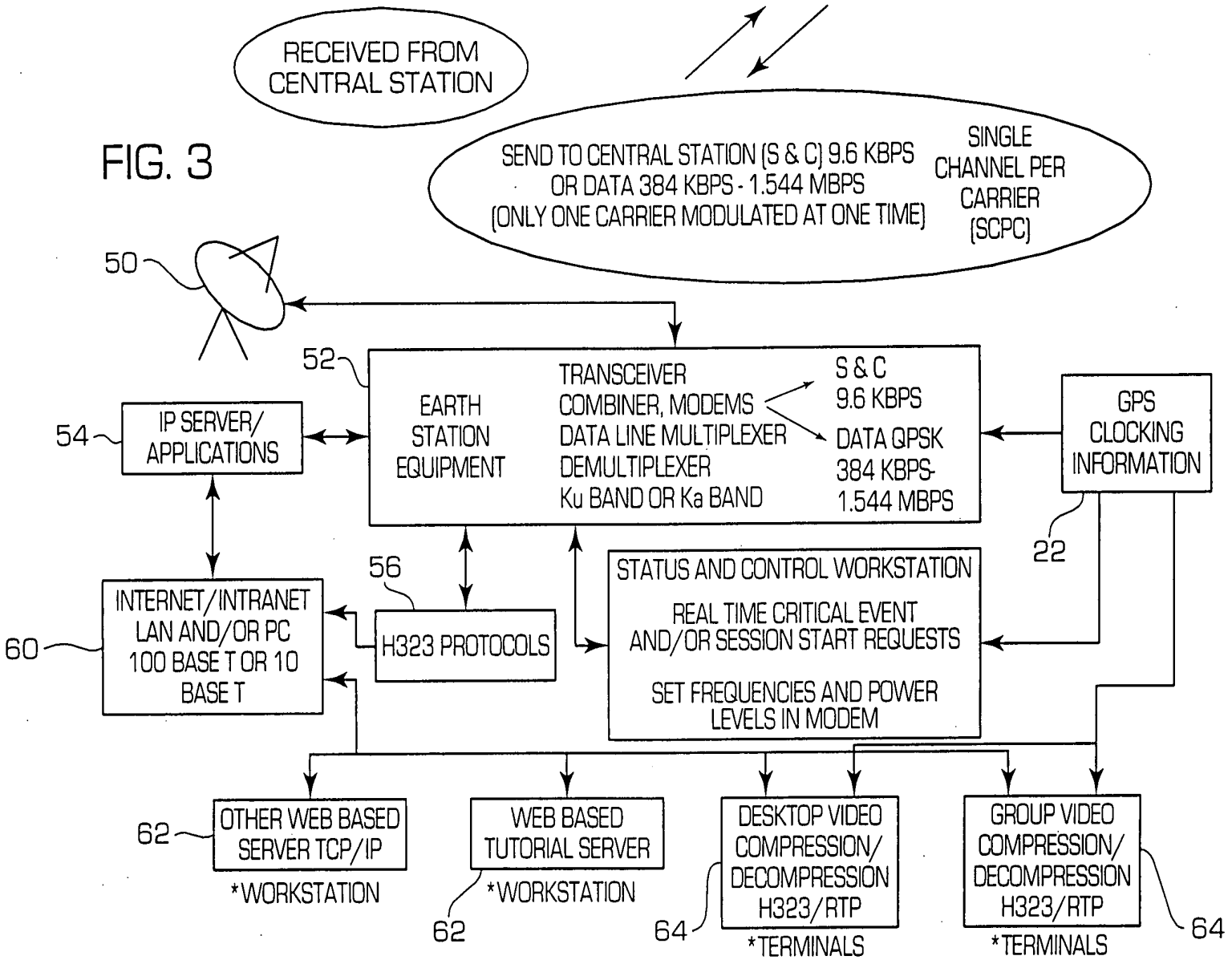

30
36
28
TRANS-CEIVER
26 *
MODU-LATOR
24 *
PACKET MULTIPLEXER (LEO SPECIAL HEADER INCLUSIVE OF DESTINATION ADDRESS AND ERROR CONTROL)
22
GPS CLOCK
20 *
TIME SYNCH
32
INTEGRATED RECEIVER DECODER DEMULTIPLEXING QPSK
GEO-STATIONARY ANTENNA
LEO-TRACKING ANTENNAS (2)
INTEGRATED RECEIVER DECODER DEMULTIPLEXING BPSK
34
18 *
SPCP UPLINK CONTROL
MPEG II, DVB, ATSC
TRANSPORT DATA STREAM
DATA TRANSFERS
S & C SYNCHRO-NOUS
S AND C PROCESSOR
REFERENCE FIG. 9A - 9E
MASTER FILE IMPLEMENTATION
INFORMATION RESOURCE
38
TELCO CONNEC-TION
H323 PROTO-COLS
TCP/IP APPLI-CATIONS
OTHER
WORK-STATION WITH IP IO

FIG. 2

FIG. 3




*NOTE: REFER TO EXAMPLE FIG. 9 THE NUMBER OF WORKSTATIONS AND TERMINALS ARE LIMITED TO QTY. 10 AT 384 KBPS, QTY 5 AT 786 KBPS, QTY. 2 AT 1.544 M/BITS. THE ACTUAL NUMBER CAN BE GREATER DEPENDING ON THE IMPLEMENTATION SIZE OF THE FILE DEFINITIONS.

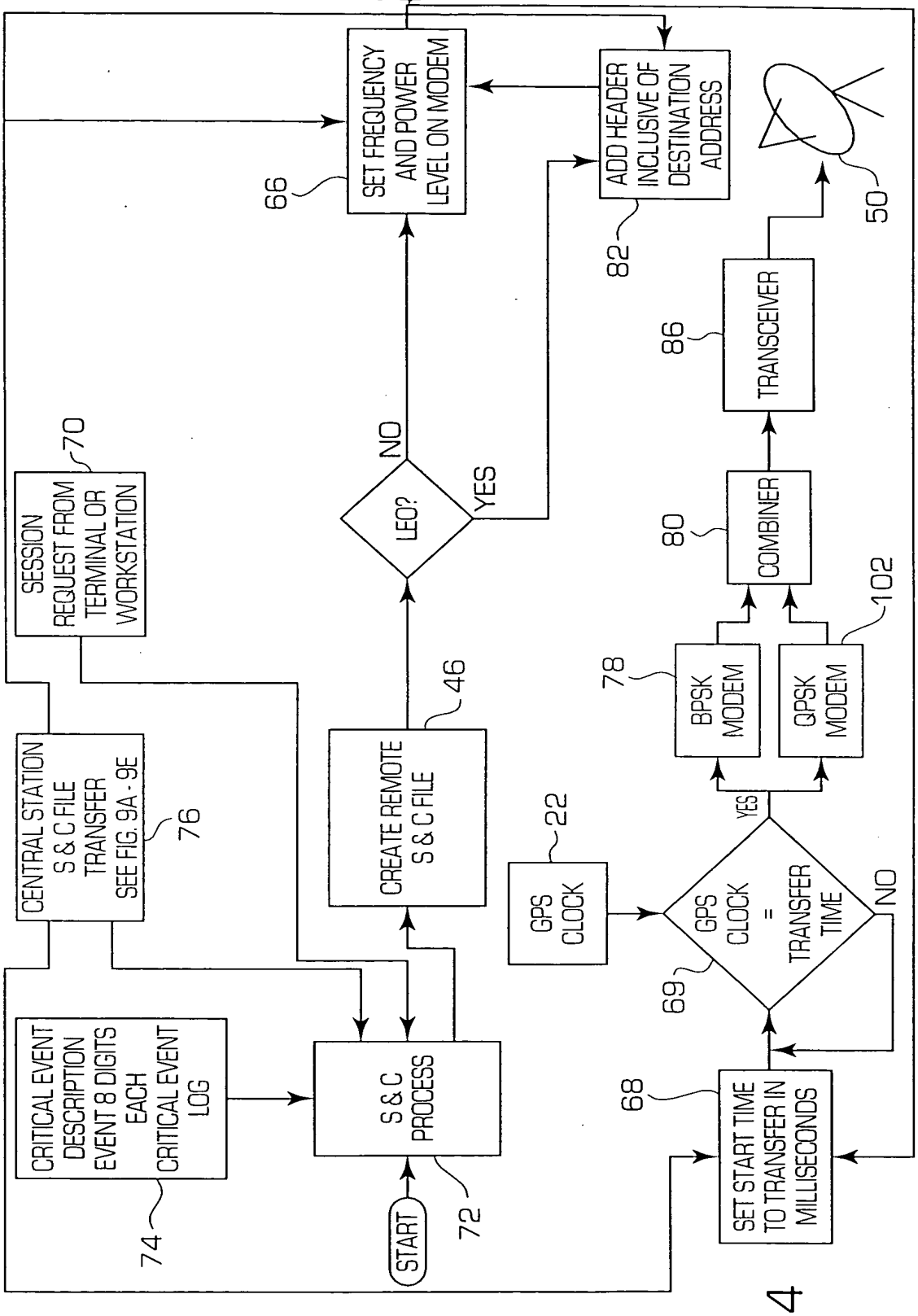

SET FREQUENCY AND POWER LEVEL ON MODEM
66
ADD HEADER INCLUSIVE OF DESTINATION ADDRESS
82
50
TRANSCEIVER
86
COMBINER
80
BPSK MODEM
78
QPSK MODEM
102
YES
NO
GPS CLOCK = TRANSFER TIME
69
NO
YES
LEO?
SESSION REQUEST FROM TERMINAL OR WORKSTATION
70
CENTRAL STATION S & C FILE TRANSFER SEE FIG. 9A - 9E
76
CREATE REMOTE S & C FILE
46
GPS CLOCK
22
CRITICAL EVENT DESCRIPTION EVENT 8 DIGITS EACH CRITICAL EVENT LOG
74
S & C PROCESS
72
START
SET START TIME TO TRANSFER IN MILLISECONDS
68

FIG. 4

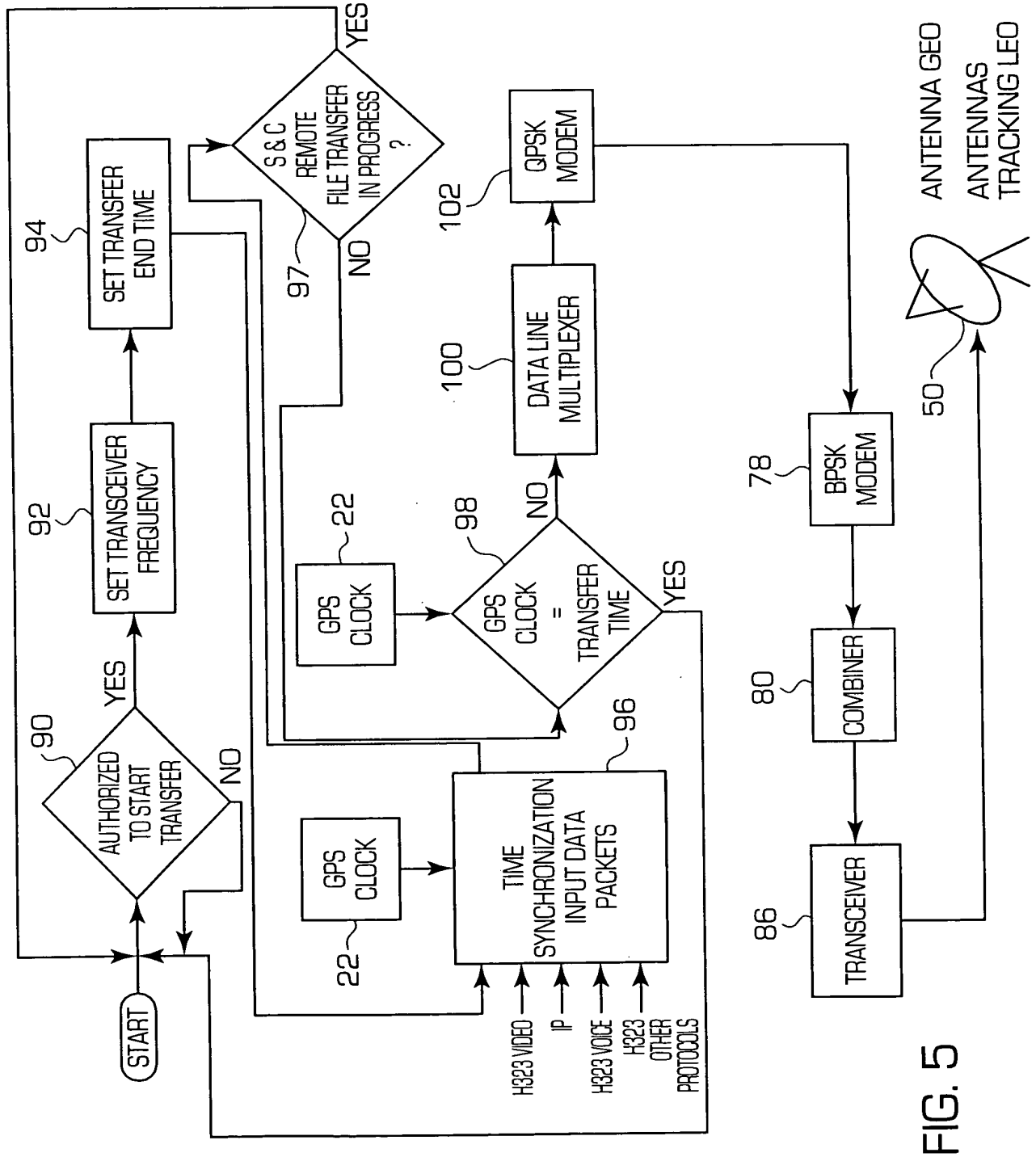
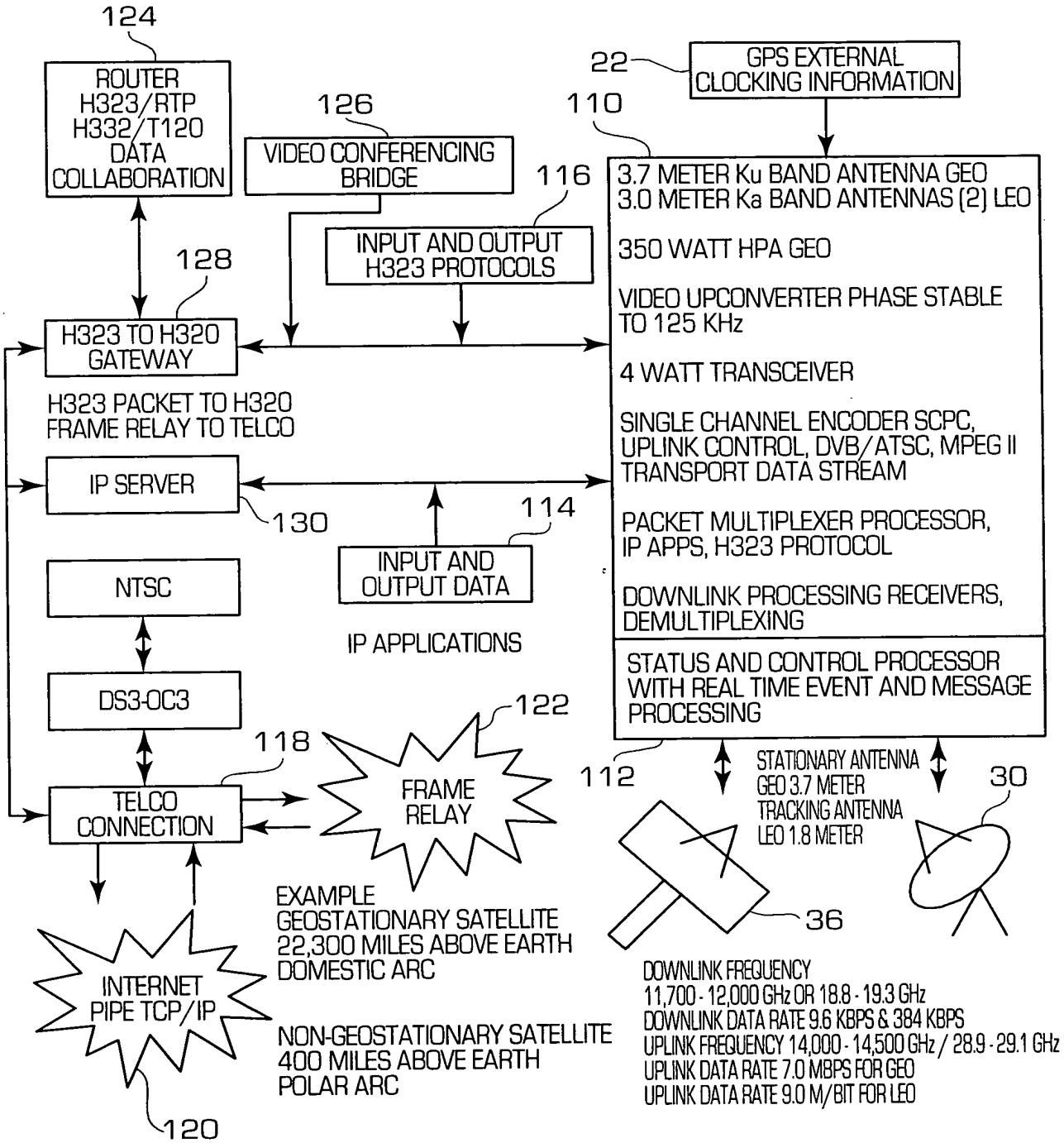

START
AUTHORIZED TO START TRANSFER
90
YES
NO
SET TRANSCEIVER FREQUENCY
92
SET TRANSFER END TIME
94
S & C REMOTE FILE TRANSFER IN PROGRESS ?
97
YES
NO
GPS CLOCK
22
GPS CLOCK = TRANSFER TIME
98
NO
YES
DATA LINE MULTIPLEXER
100
QPSK MODEM
102
GPS CLOCK
22
TIME SYNCHRONIZATION INPUT DATA PACKETS
96
H323 VIDEO
IP
H323 VOICE
H323 OTHER PROTOCOLS
TRANSCEIVER
86
COMBINER
80
BPSK MODEM
78
ANTENNA GEO
ANTENNAS TRACKING LEO
50

FIG. 5

FIG. 6


124
ROUTER
H323/RTP
H332/T120
DATA
COLLABORATION
126
VIDEO CONFERENCING
BRIDGE
22
GPS EXTERNAL
CLOCKING INFORMATION
110
116
INPUT AND OUTPUT
H323 PROTOCOLS
3.7 METER Ku BAND ANTENNA GEO
3.0 METER Ka BAND ANTENNAS (2) LEO
350 WATT HPA GEO
VIDEO UPCONVERTER PHASE STABLE
TO 125 KHz
4 WATT TRANSCEIVER
SINGLE CHANNEL ENCODER SCPC,
UPLINK CONTROL, DVB/ATSC, MPEG II
TRANSPORT DATA STREAM
PACKET MULTIPLEXER PROCESSOR,
IP APPS, H323 PROTOCOL
DOWNLINK PROCESSING RECEIVERS,
DEMULTIPLEXING
128
H323 TO H320
GATEWAY
H323 PACKET TO H320
FRAME RELAY TO TELCO
IP SERVER
130
114
INPUT AND
OUTPUT DATA
IP APPLICATIONS
NTSC
DS3-OC3
STATUS AND CONTROL PROCESSOR
WITH REAL TIME EVENT AND MESSAGE
PROCESSING
122
118
112
STATIONARY ANTENNA
GEO 3.7 METER
TRACKING ANTENNA
LEO 1.8 METER
30
TELCO
CONNECTION
FRAME
RELAY
EXAMPLE
GEOSTATIONARY SATELLITE
22,300 MILES ABOVE EARTH
DOMESTIC ARC
36
INTERNET
PIPE TCP/IP
NON-GEOSTATIONARY SATELLITE
400 MILES ABOVE EARTH
POLAR ARC
DOWNLINK FREQUENCY
11,700 - 12,000 GHz OR 18.8 - 19.3 GHz
DOWNLINK DATA RATE 9.6 KBPS & 384 KBPS
UPLINK FREQUENCY 14,000 - 14,500 GHz / 28.9 - 29.1 GHz
UPLINK DATA RATE 7.0 MBPS FOR GEO
UPLINK DATA RATE 9.0 M/BIT FOR LEO
120

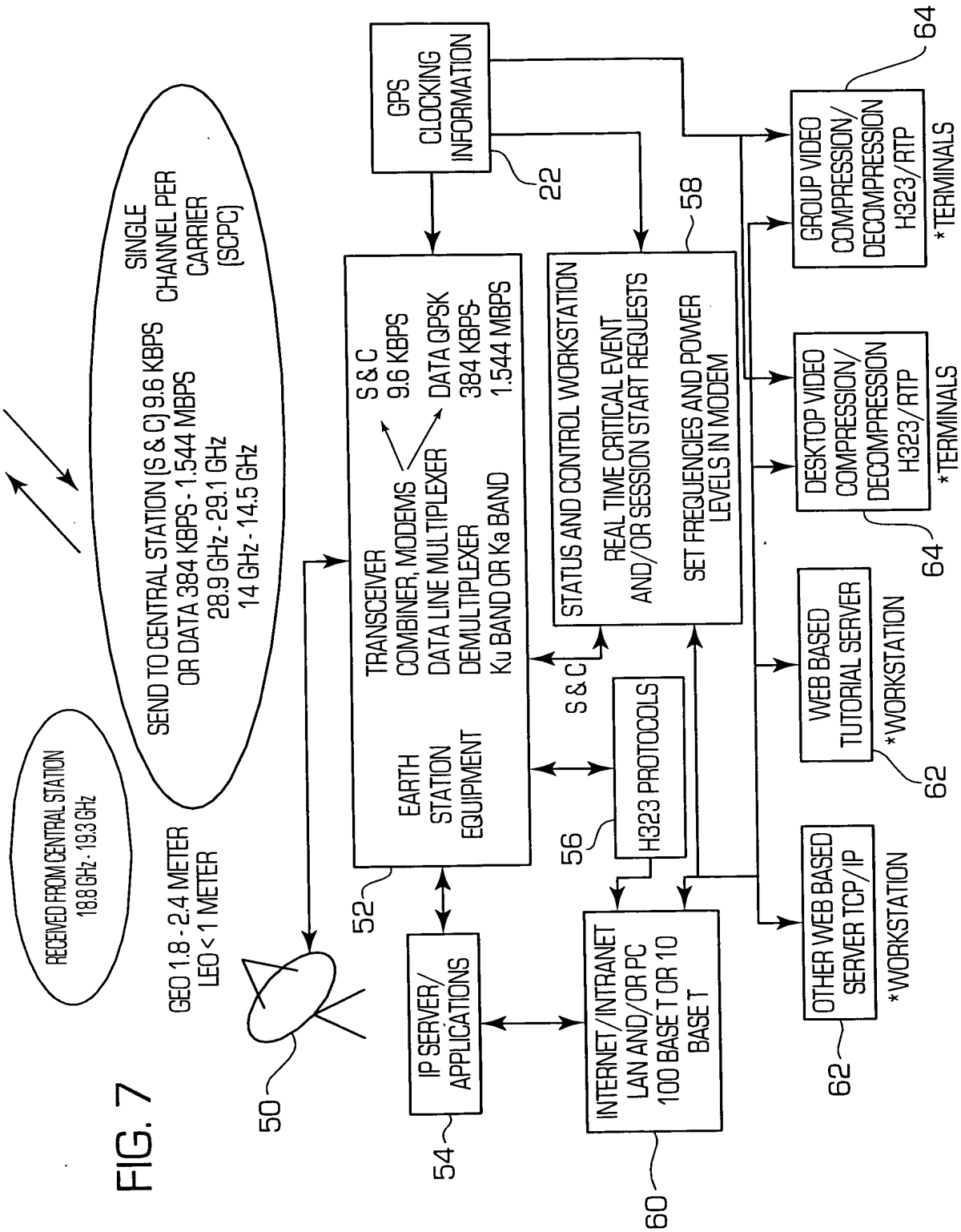
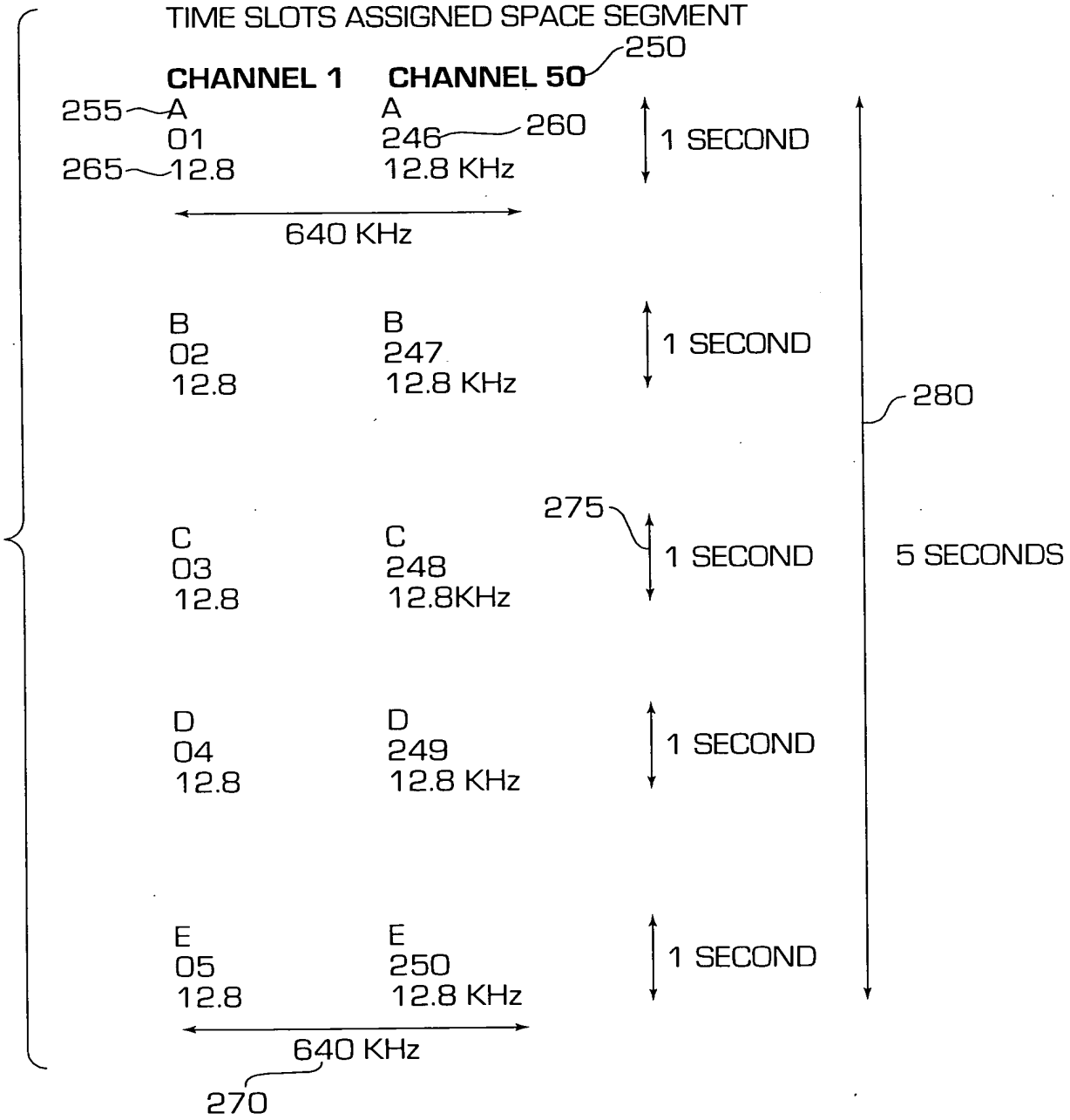

RECEIVED FROM CENTRAL STATION
18.8 GHz - 19.3 GHz
SEND TO CENTRAL STATION (S & C) 9.6 KBPS
OR DATA 384 KBPS - 1.544 MBPS
28.9 GHz - 29.1 GHz
14 GHz - 14.5 GHz
SINGLE CHANNEL PER CARRIER (SCPC)
GEO 1.8 - 2.4 METER
LEO < 1 METER
50
EARTH STATION EQUIPMENT
TRANSCEIVER
COMBINER, MODEMS
DATA LINE MULTIPLEXER
DEMULTIPLEXER
Ku BAND OR Ka BAND
S & C 9.6 KBPS
DATA QPSK 384 KBPS- 1.544 MBPS
52
GPS CLOCKING INFORMATION
22
STATUS AND CONTROL WORKSTATION
REAL TIME CRITICAL EVENT AND/OR SESSION START REQUESTS
SET FREQUENCIES AND POWER LEVELS IN MODEM
58
S & C
H323 PROTOCOLS
56
IP SERVER/ APPLICATIONS
54
INTERNET/INTRANET LAN AND/OR PC 100 BASE T OR 10 BASE T
60
GROUP VIDEO COMPRESSION/ DECOMPRESSION H323/RTP
*TERMINALS
64
DESKTOP VIDEO COMPRESSION/ DECOMPRESSION H323/RTP
*TERMINALS
64
WEB BASED TUTORIAL SERVER
*WORKSTATION
62
OTHER WEB BASED SERVER TCP/IP
*WORKSTATION
62

FIG. 7

FIG. 8A


TIME SLOTS ASSIGNED SPACE SEGMENT
250
CHANNEL 1
CHANNEL 50
255
A
01
265
12.8
A
246
260
12.8 KHz
1 SECOND
640 KHz
B
02
12.8
B
247
12.8 KHz
1 SECOND
280
275
C
03
12.8
C
248
12.8KHz
1 SECOND
5 SECONDS
D
04
12.8
D
249
12.8 KHz
1 SECOND
E
05
12.8
E
250
12.8 KHz
1 SECOND
640 KHz
270

# FIG. 8B

170

| | | | | TRANSMITTED FROM CENTRAL | TRANSMITTED FROM REMOTE |
|---|---|---|---|---|---|
| A | 15 | 9 | DATA TRANSFER BANDWIDTH (FROM CENTRAL) | 9 | 0 |

175

| A | NE | E | CHANNEL AN | CHANNEL E | N AN H | AN C E |
|---|---|---|---|---|---|---|
| 3 | 10 | | XX | 384 = | 3 | |
| 3 | 5 | | XX | 768 = | 7 | |
| 3 | 2 | | XX | T1 = | 1 | |
| | | | | NOT ACTIVE = | 0 | |

| | | | | | |
|---|---|---|---|---|---|
| A | 16 | 10 | DATA TRANSFER TYPE (FROM CENTRAL) | 10 | 0 |

| A A | E | C E | |
|---|---|---|---|
| IP | | 1 | EXAMPLE 1111133333 = |
| H323 | | 3 | QTY 5 IP'S AND QTY 5 H323'S |

| | | | | | |
|---|---|---|---|---|---|
| A | 17 | 5 | DATA TRANSFER TYPE (FROM CENTRAL) | 5 | 0 |

| A A | E | C E | |
|---|---|---|---|
| IP | | 1 | EXAMPLE 11333 = |
| H323 | | 3 | QTY 2 IP'S AND QTY 3 H323'S |

| | | | | | |
|---|---|---|---|---|---|
| A | 18 | 2 | DATA TRANSFER TYPE (FROM CENTRAL) | 2 | 0 |

| A A | E | C E | |
|---|---|---|---|
| IP | | 1 | EXAMPLE 33 = |
| H323 | | 3 | QTY 2 H323'S |

| | | | | | |
|---|---|---|---|---|---|
| A | 19 | 8 | SLOT TRANSFER TIME ASSIGNED | 8 | 0 |
| A | 20 | 8 | SLOT FREQUENCY ASSIGNED | 8 | 0 |
| A | 21 | 8 | SLOT TRANSFER TIME NOT ASSIGNED - OVERFLOW | 8 | 0 |
| A | 22 | 8 | SLOT FREQUENCY NOT ASSIGNED - OVERFLOW | 8 | 0 |
| A | 23 | 16 | TRANSCEIVER FREQUENCY SET FROM CENTRAL | 16 | 0 |
| A | 24 | 8 | TRANSCEIVER POWER LEVEL SET FROM CENTRAL | 8 | 0 |
| A | 25 | 1 | STATUS OF PREVIOUS TRANSMISSION GOOD G OR RETRANSMIT R | 1 | 1 |
| A | 26 | 1 | REQUEST DATA TRANSFERS ONLY TO START (1) REQUEST REAL TIME EVENTS ONLY TO START (2) REQUEST FOR DATA TRANSFERS AND REAL TIME EVENTS ONLY TO START (3) | 1 | 1 |
| | | | A1 - A26 | 158 | 135 |

180 182

# FIG. 9A

150

TRANSMISSION AND OPERATIONAL INFORMATION - S & C

| 155 CA E | 160 E | | 165 CHA AC E E C N | 170 CEN AL E | 175 E |
|---|---|---|---|---|---|
| A | 1 | 8 | NUMBER | 8 | 8 |
| A | 2 | 16 | LOCATION ADDRESS | 16 | 16 |
| A | 3 | 1 | SYSTEM STATUS - OPERATIONAL, UNDER CONSTRUCTION, TESTING, SUSPENDED (O, U, T, S) | 1 | 1 |
| A | 4 | 16 | AUTHORIZATION CODE OF RECEIVER AT REMOTE | 16 | 0 |
| A | 5 | 16 | AUTHORIZATION CODE OF RECEIVER AT CENTRAL | 0 | 16 |
| A | 6 | 1 | SCRAMBLED DATA SCRAMBLED (1), UNSCRAMBLED (0) | 1 | 0 |
| A | 7 | 16 | OPERATIONAL DATE | 16 | 0 |
| A | 8 | 16 | DATE OF CONFIGURATION UPDATE MM, DD, YY, TIME (8) | 0 | 16 |
| A | 9 | 16 | MAINTENANCE DATA | 16 | 0 |
| A | 10 | 50 | MESSAGE TO REQUEST CHANGES IN A1 - A25 | 0 | 50 |
| A | 11 | 9 | DATA TRANSFER BANDWIDTHS (FROM REMOTE) | 0 | 9 |

| A A NE E | CHANNEL AN E | CHANNEL E N AN | H AN C E |
|---|---|---|---|
| 3 10 | XX | 384 = | 3 EXAMPLE 073 |
| 3 5 | XX | 768 = | 7 SEVEN |
| 3 2 | XX | T1 = | 1 CHANNELS OF 384 KBPS |
| | | NOT ACTIVE = | 0 |

| | | | | | |
|---|---|---|---|---|---|
| A | 12 | 10 | DATA TRANSFER TYPE (FROM REMOTE) AT 384 KBPS | 0 | 10 |

| A A E | C E | |
|---|---|---|
| IP | 1 | EXAMPLE 1111133333 = |
| H323 | 3 | QTY 5 IP'S AND QTY 5 H323'S |

| | | | | | |
|---|---|---|---|---|---|
| A | 13 | 5 | DATA TRANSFER TYPE (FROM REMOTE) AT 768 KBPS | 0 | 5 |

| A A E | C E | |
|---|---|---|
| IP | 1 | EXAMPLE 11333 = |
| H323 | 3 | QTY 2 IP'S AND QTY 3 H323'S |

| | | | | | |
|---|---|---|---|---|---|
| A | 14 | 2 | DATA TRANSFER TYPE (FROM REMOTE) AT 1.544 M/BITS | 0 | 2 |

| A A E | C E | |
|---|---|---|
| IP | 1 | EXAMPLE 33 = |
| H323 | 3 | QTY 2 H323'S |

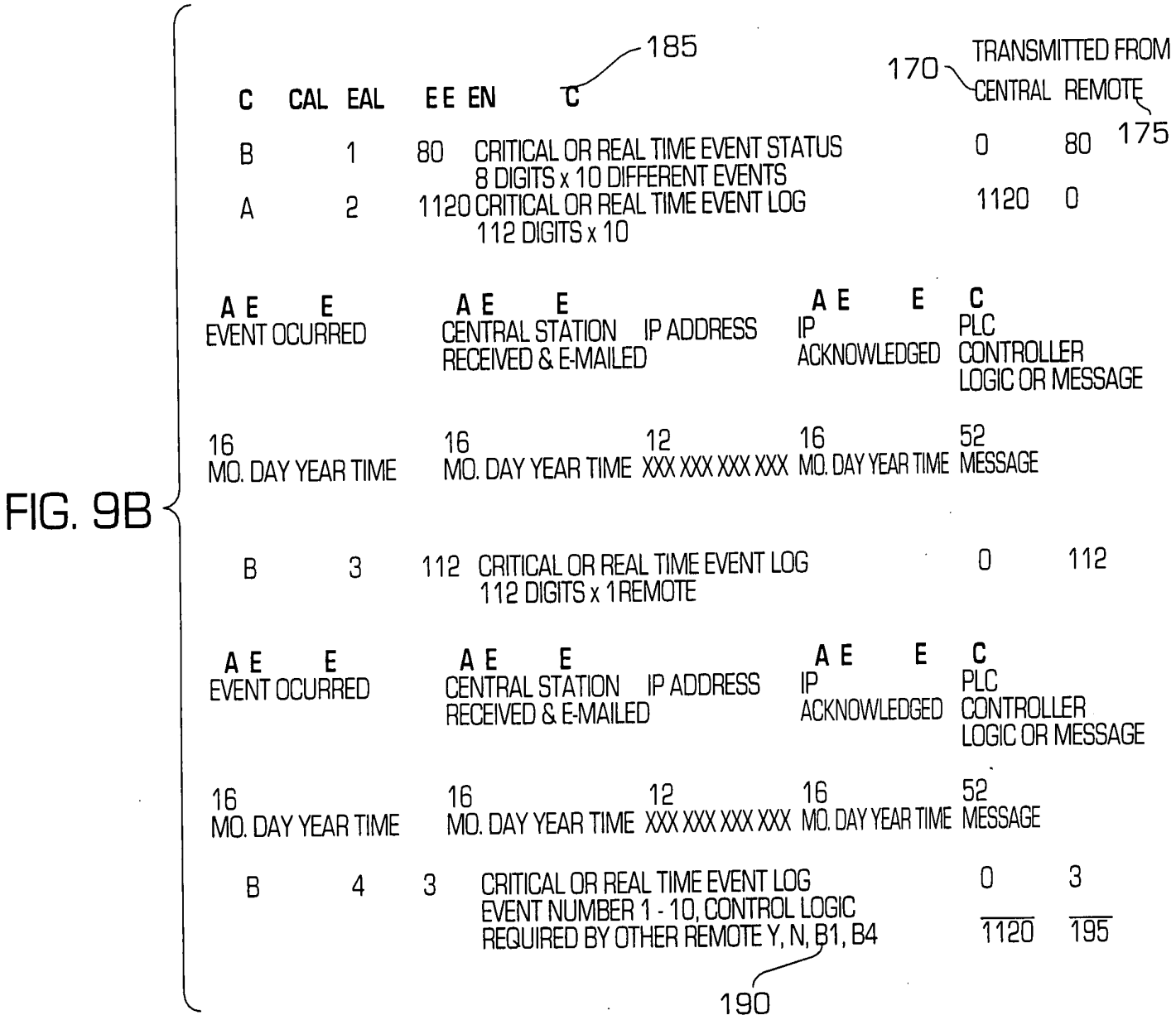



FIG. 9B

# FIG. 9C

| A A EC N A H — 195 | | | | TRANSMITTED FROM | |
|---|---|---|---|---|---|
| | | | 170 | CENTRAL | REMOTE 175 |
| 384 KBPS TRANSFER — 200 | | | | | |
| C | 1 | 80 | TRANSFER FREQUENCY 8 DIGITS EACH x 10 | 80 | 0 |
| C | 2 | 80 | TRANSFER POWER LEVEL 8 DIGITS EACH x 10 | 80 | 0 |
| C | 3 | 80 | TRANSFER START TIME 8 DIGITS EACH x 10 | 80 | 0 |
| C | 4 | 80 | TRANSFER STOP TIME 8 DIGITS EACH x 10 | 80 | 0 |
| C | 5 | 120 | TRANSFER FROM REMOTE STATION ID AND OR WORKSTATION 12 DIGITS x 10 | 0 | 120 |
| C | 6 | 120 | TRANSFER TO WORKSTATION 12 DIGITS x 10 | 120 | 0 |
| C | 7 | 120 | TRANSFER TO TERMINAL 120 DIGITS x 10 | 120 | 0 |
| C | 8 | 40 | TRANSFER TO GROUP 4 DIGITS x 10 | 0 | 40 |
| | | | 205 — C1 - C8 | 400 | 160 |
| 210 | | | | | |
| 786 KBPS TRANSFER | | | | | |
| D | 1 | 40 | TRANSFER FREQUENCY 8 DIGITS x 5 | 40 | 0 |
| D | 2 | 40 | TRANSFER POWER LEVEL 8 DIGITS x 5 | 40 | 0 |
| D | 3 | 40 | TRANSFER START TIME 8 DIGITS x 5 | 40 | 0 |
| D | 4 | 40 | TRANSFER STOP TIME 8 DIGITS x 5 | 40 | 0 |
| D | 5 | 60 | TRANSFER FROM REMOTE STATION ID AND OR TERMINAL OR WORKSTATION 12 DIGITS x 5 | 0 | 60 |
| D | 6 | 60 | TRANSFER TO WORKSTATION 12 DIGITS x 5 | 60 | 0 |
| D | 7 | 60 | TRANSFER TO TERMINAL 12 DIGITS x 5 | 60 | 0 |
| D | 8 | 20 | TRANSFER TO GROUP 4 DIGITS x 5 | 0 | 20 |
| | | | 215 — D1 - D7 | 270 | 80 |
| 220 | | | | | |
| 1.5 KBPS TRANSFER | | | | | |
| E | 1 | 16 | TRANSFER FREQUENCY 8 DIGITS x 2 | 16 | 0 |
| E | 2 | 16 | TRANSFER POWER LEVEL 8 DIGITS x 2 | 16 | 0 |
| E | 3 | 16 | TRANSFER START TIME 8 DIGITS x 2 | 16 | 0 |
| E | 4 | 16 | TRANSFER STOP TIME 8 DIGITS x 2 | 16 | 0 |
| E | 5 | 24 | TRANSFER FROM REMOTE STATION ID AND OR TERMINAL OR WORKSTATION 12 DIGITS x 2 | 0 | 24 |
| E | 6 | 24 | TRANSFER TO WORKSTATION 12 DIGITS x 2 | 24 | 0 |
| E | 7 | 24 | TRANSFER TO TERMINAL 12 DIGITS x 2 | 24 | 0 |
| E | 8 | 8 | TRANSFER TO GROUP 4 DIGITS x 2 | 0 | 8 |
| | | | E1 - E8 | 112 | 32 |
| | | | TOTALS A, B, C, D, E | 2060 | 602 |

FIG. 9D

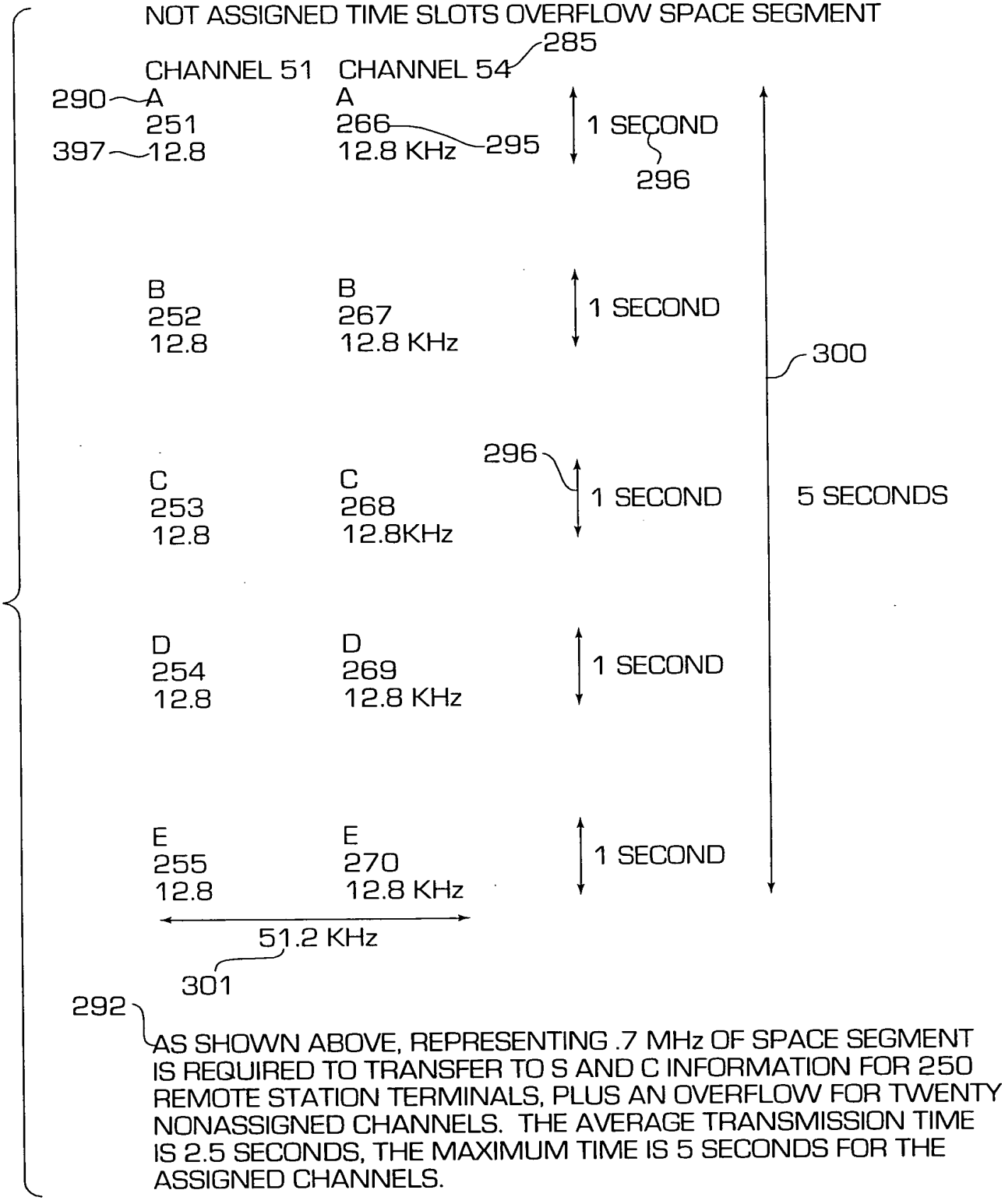
E N N A E 1 —235

| | # OF DIGITS |
|---|---|
| CLASS A | 3 |
| CLASS B | 3 |
| CLASS C | 3 |
| IP ADDRESS WITHIN CLASS C 230 | 3 |
| TOTAL | 12 |

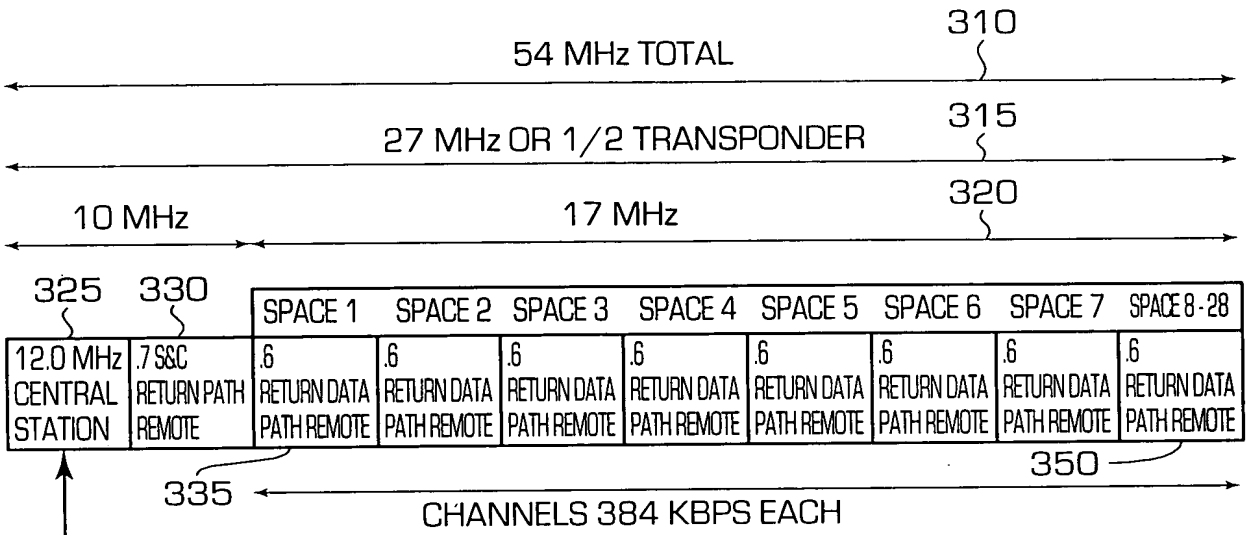
DEFINITION OF GROUP (4 DIGITS) —236

GROUP 0001 - 9999

# FIG. 9E


NOT ASSIGNED TIME SLOTS OVERFLOW SPACE SEGMENT
285
CHANNEL 51
CHANNEL 54
290
A
251
397
12.8
A
266
12.8 KHz
295
1 SECOND
296
B
252
12.8
B
267
12.8 KHz
1 SECOND
300
296
C
253
12.8
C
268
12.8KHz
1 SECOND
5 SECONDS
D
254
12.8
D
269
12.8 KHz
1 SECOND
E
255
12.8
E
270
12.8 KHz
1 SECOND
51.2 KHz
301
292
AS SHOWN ABOVE, REPRESENTING .7 MHz OF SPACE SEGMENT IS REQUIRED TO TRANSFER TO S AND C INFORMATION FOR 250 REMOTE STATION TERMINALS, PLUS AN OVERFLOW FOR TWENTY NONASSIGNED CHANNELS. THE AVERAGE TRANSMISSION TIME IS 2.5 SECONDS, THE MAXIMUM TIME IS 5 SECONDS FOR THE ASSIGNED CHANNELS.

# FIG. 10




TRANSPORT DATA STREAM

| | |
|---|---|
| S AND C FILE | 1.4 M/BITS |
| ALONG WITH DATA | 5.6 M/BITS |
| * | 7.0 M/BITS |

340

345

| TIME SLOT TDMA | WITH OVERFLOW |
|---|---|
| KHz 12.8 12.8 12.8 | 12.8 |

| 1 | 2 | 3 | 4-53 | 54 |
|---|---|---|---|---|

S AND C CHANNEL NUMBER

SEE FIG. 8

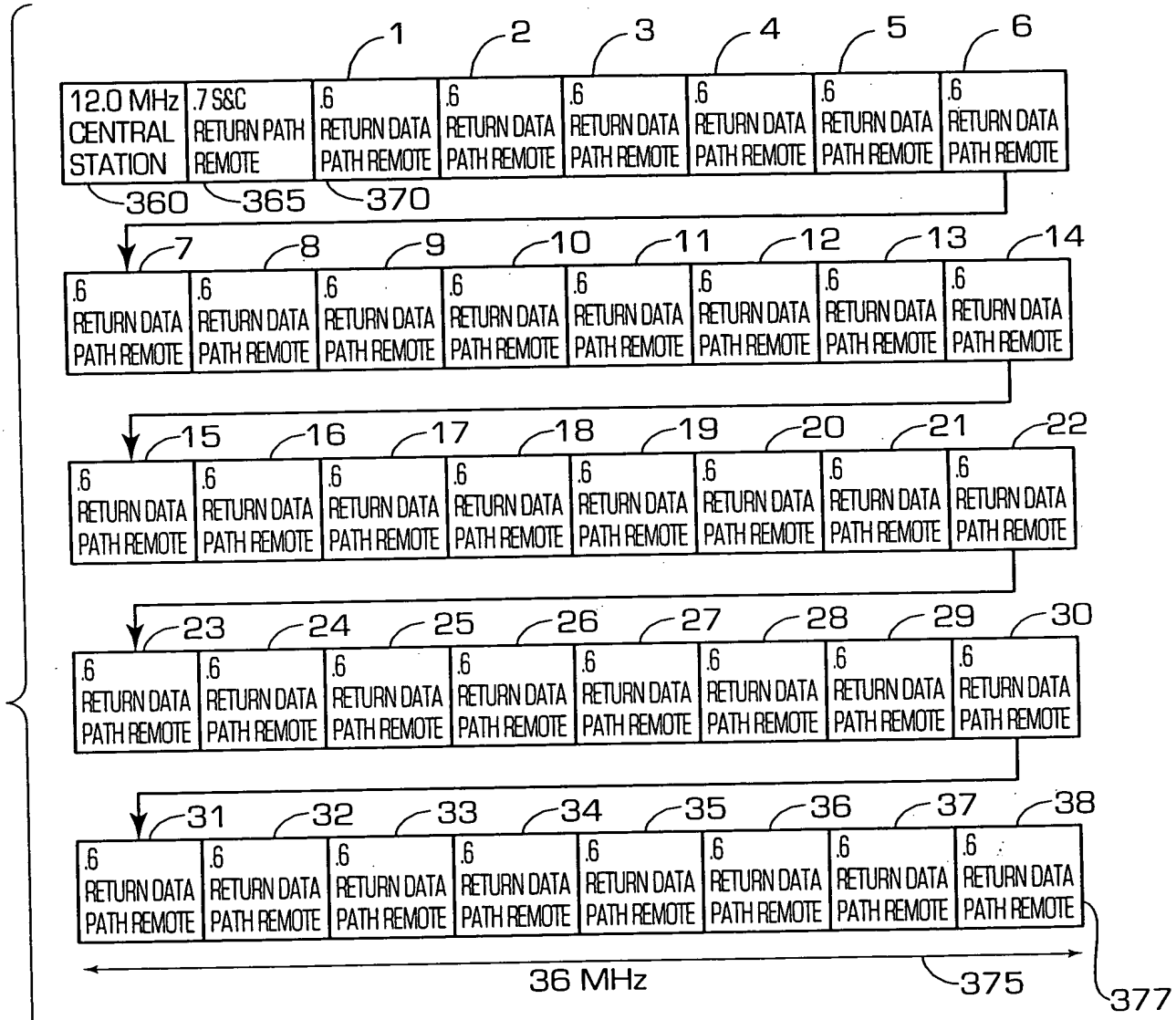
7.0 M/BITS REQUIRE 9.31 MHz OF SPACE SEGMENT

THE S & C FILE TRANSFER RATE IS 9.6 KBPS WHICH USES 12.8 KBPS OF SPACE SEGMENT x 54 = 0.7 MHz OF SPACE SEGMENT

TWO HUNDRED FIFTY REMOTE SITES CAN ACCESS ONE OF TWENTY EIGHT 384 KBPS DATA CHANNELS. THE CENTRAL SITE CAN TRANSMIT 7 M/BITS OF DATA AT AN EFFECTIVE RATE OF 14.0 MBITS USING A QPSK MODULATION SCHEME

NOTE: THE 250 REMOTES WILL NEED TO BE ADDRESSED ONCE EACH FIVE SECONDS. THEREFORE, 54 REMOTES WILL HAVE THIER FILES TRANSFERRED. EVERY SECOND, THERE ARE 2,300 DIGITS (2300 x 8 = 18,400) or 18,400 BITS TO TRANSMIT PER REMOTE. THE TOTAL TRANSFER WILL BE 18,400 BITS PER REMOTE TIMES 54 REMOTES THAT NEED TO BE ADDRESSED EACH SECOND. 18,400 x 54 = 993,600 BITS PER SECOND OR 993,600 x 1.33 = 1.32 MEGABITS OF BANDWIDTH

FIG. 11




250 REMOTE SITES CAN ACCESS ONE OF THIRTY-EIGHT 384 KBPS DATA CHANNELS. *THE CENTRAL SITE CAN TRANSMIT 9.0 M/BITS OF **SYNCHRONOUS AND ASYNCHRONOUS DATA WITH AN EFFECTIVE THROUGHPUT RATE OF 18 M/BITS BY USING A QPSK MODULATION SCHEME. THE .7 KBPS OF S & C FILE UPDATE REMOTE INFORMATION (SEE TIME SLOTS IN FIG. 8) WILL USE A BPSK MODULATION SCHEME. **THIS IMPLEMENTATION IS BASED ON SYNCHRONOUS DATA.